

[This Drawing is a reproduction of the Original on a reduced scale.]

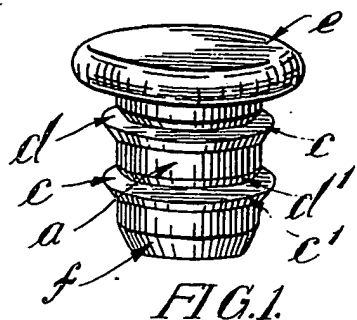


FIG. 1.

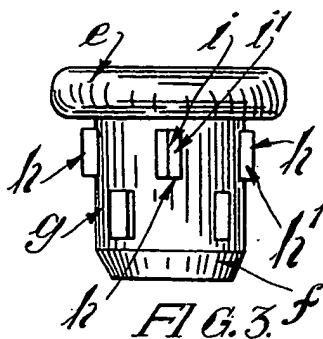


FIG. 3.

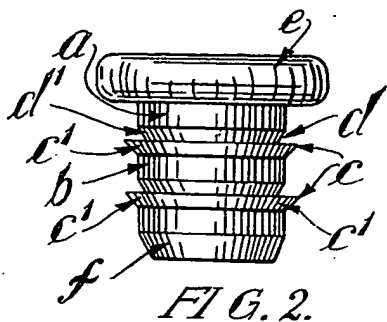


FIG. 2.

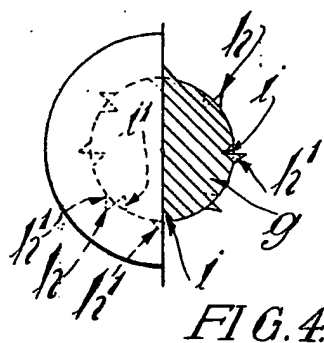


FIG. 4.

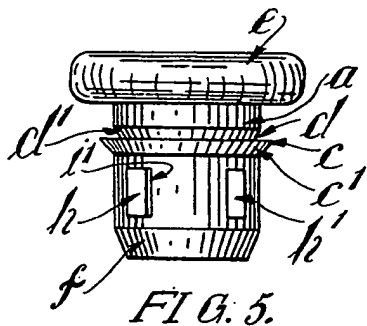


FIG. 5.

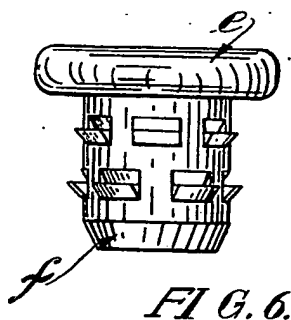


FIG. 6.

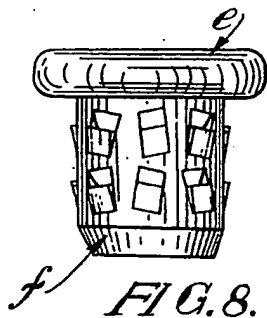


FIG. 8.

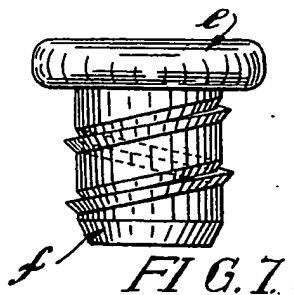


FIG. 7.

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PATENT SPECIFICATION



Application Date: Oct. 14, 1938. No. 29750/38.

520.169

Complete Specification Left: Oct. 12, 1939.

Complete Specification Accepted: April 16, 1940.

PROVISIONAL SPECIFICATION

Improvements in or relating to Rubber Plugs or Stoppers

We, UNIVERSAL RUBBER PAVIORS LIMITED, of 1-4, Great Tower Street, London, E.C.3, and Canning Street, Audenshaw, Manchester, and LUCIEN GAISMAN, a citizen of Switzerland, of the said Company's Manchester address, do hereby declare the nature of this invention to be as follows:—

This invention relates to rubber plugs or stoppers.

Rubber plugs or stoppers are known, for example, as provided for closing the end of a tubular handle bar of a bicycle, such stoppers each consisting of a rubber body with screw clamping means for expanding the body and causing it to grip against the inner wall of the tube.

The object of the invention is an improved construction of rubber plug or stopper which will hold itself in position without the assistance of screw clamping means.

According to the invention, the improved rubber plug or stopper is characterised in that the body of the plug is formed with one or more ribs or projections and a groove or recess immediately adjacent to each rib or projection and on the head side thereof into which the rib or projection may be wholly or partly displaced as the plug is pressed into position.

In one example of the invention, a rubber plug suitable for fitting into the open end of a tubular handle bar of a bicycle, has a cylindrical body part which is of flexible and elastic rubber of firm texture. The normal cylindrical diameter is such that the plug would be a fairly easy push fit into the open end of the handle bar.

On the periphery of the cylindrical portion are formed two annular ribs spaced equally along the length thereof and in section of saw tooth shape with a backward inclination towards the head end of the plug. Immediately behind i.e., on the head side of each rib is an annular groove of inclined or wedge shape in section and slightly smaller than the rib. The head of the plug may be of any shape whilst the inner end of the plug is preferably tapered to facilitate insertion.

In use, the plug is fitted merely by inserting the end into the tube and pushing it in. As the ribs in turn engage the end of the tube they are pressed back and displaced into the recesses behind them, the inclined leading wall of the rib helping to give a lead as it is forced into the tube.

When the plug has been pushed in until the head engages the end of the tube, it will be found that it is securely fastened in position and requires very considerable force to extract it, the reason being that any outward movement of the plug is resisted by the frictional drag or engagement of the ribs because pressure on the ribs in such direction tends to cause them to leave their recesses and wedge between the cylindrical body of the plug and the wall of the tube, there being no recess on the other side of the rib into which it can be displaced. By making the recess slightly smaller than the ribs an additional initial tightness is obtained.

It has been found that the improved plug, if properly dimensioned, gives a better hold in the tube than the expanding plug type above referred to. At the same time, the improved plug is simpler and cheaper in construction and easier to fit.

The invention is obviously not limited to the example above described as the details thereof may clearly be modified without departing from the ambit of the invention. For example, the ribs, instead of being of saw tooth section may be of rounded shape and the recesses behind them may be of rounded shape also, whilst such recesses may be of the same sizes or slightly larger than the ribs. Also the ribs may be of spiral or of interrupted form.

Whilst above described in its application as a plug for the end of a cycle handle bar, it is obviously capable of other uses for which perhaps certain modifications of shape may be necessary.

Dated this 13th day of October, 1938.

For the Applicants,
WILSON GUNN & ELLIS,
Chartered Patent Agents,
54-56, Market Street, Manchester, 1.

COMPLETE SPECIFICATION

Improvements in or relating to Rubber Plugs or Stoppers

We, UNIVERSAL RUBBER PAVIORS LIMITED, of 1-4, Great Tower Street, London, E.C.3, and Canning Street, Audenshaw, Manchester, and LUCIEN GAISMAN, a naturalised British subject, of the said Company's Manchester address, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to rubber plugs or stoppers.

Rubber plugs or stoppers are known, for example, as provided for closing the end of a tubular handle bar of a bicycle, such stoppers each consisting of a rubber body with screw clamping means for expanding the body and causing it to grip against the inner wall of the tube.

The object of the invention, is an improved construction of rubber plug or stopper which will hold itself in position without the assistance of screw clamping means.

According to the invention, the improved rubber plug or stopper is characterised in that the body of the plug is formed on its outer periphery with one or more ribs or projections and a groove or recess immediately adjacent to each rib or projection into which the rib or projection may be wholly or partly displaced in one direction as the plug is pressed into position.

In a preferred embodiment of the invention the groove or recess is provided immediately adjacent and on the outer or head side of the rib or projection.

In the accompanying drawing:—

Fig. 1 is a perspective view, and

Fig. 2 is a front view of one example of rubber plug or stopper made in accordance with the invention.

Fig. 3 is a front view of an alternative form of the invention.

Fig. 4 is a cross sectional plan of Fig. 3.

Figs. 5, 6, 7 and 8 show further modifications.

In the example of the invention illustrated in Figs. 1 and 2, a rubber plug suitable for fitting into the open end of a tubular handle bar of a bicycle, has a cylindrical body part *a* which is of flexible and elastic rubber of firm texture. The normal cylindrical diameter at *b* is such that the plug would be a fairly loose fit in the open end of the handle bar.

On the periphery of the cylindrical portion *a* are formed two annular ribs *c*

spaced equally along the length thereof and in section of saw tooth shape with a backwardly inclined inner face *c'*. Immediately behind, i.e., on the outer or head side of each rib *c* is an annular groove *d* of inclined or wedge shape in section and slightly smaller than the rib, the inner wall of the groove being a continuation of the outer wall of the rib, whilst the other wall *d'* i.e., that nearest to the head, is inclined parallel to the inclined wall *c'* of the rib. The head *e* of the plug may be of any shape whilst the inner end of the plug is preferably tapered at *f* to facilitate insertion.

In use, the plug is fitted merely by inserting the tapered end *f* into the tube and pushing it in. As the ribs *c* in turn engage the end of the tube they are pressed back and displaced into the recesses *d* behind them, the inclined leading wall *c'* of the rib helping to give a lead as it is forced into the tube.

When the plug has been pushed in until the head engages the end of the tube, it will be found that it is securely fastened in position and requires very considerable force to extract it, the reason being that any outward movement of the plug is resisted by the frictional drag or engagement of the ribs on the inside wall of the tube, because pressure on the ribs in such direction tends to cause them to leave their recesses and wedge between the loose fitting cylindrical part *b* of the body of the plug and the wall of the tube, there being no recess on the other side of the rib into which it can be displaced. By making the recess *d* slightly smaller than the ribs an additional initial tightness is obtained. The wedge shape of the ribs accentuates this tightening action.

In a modification of the invention as shown in Figs. 3 and 4, the plug *g* is formed with a series of projecting studs *h* of saw tooth shape, each having an inclined wall *h'* on one side and a substantially radial wall on the other. Immediately adjacent to the radial wall there is formed a recess *i* having a radial wall which is substantially a continuation of the radial wall of the tooth and an inclined wall *i'* parallel to the inclined wall *h'*. Each recess is slightly smaller than its adjacent tooth.

In use, the plug can easily be inserted by a pushing or a screwing action, that is to say, by a combined inward pressure and rotation in a direction to cause the studs to be displaced sideways into their recesses. Immediately the rotational

torque is released the projections tend by their natural resilience to rise out of their recesses and grip frictionally against the inside of the tube. Any attempt to withdraw the plug by a direct outward pull is resisted by reason of the fact that such outward pull tends to cause the teeth to wedge between the body of the plug and the wall of the tube instead of lying down into their recesses. Consequently in order to withdraw the plug it is necessary also to do so with a similar screwing action with the direction of rotation the same as for inserting the plug, thus similarly causing the teeth to lie down into their recesses and permitting the plug to be withdrawn. Obviously the plug offers resistance to rotation in the other direction as any attempt at such rotation causes the rubber to wedge between the wall of the plug and the inner wall of the tube.

In a further modification as shown in Fig. 5, the plug could incorporate in combination the annular ribs of the first example and the teeth of the second example, so that not only does the plug offer resistance to withdrawal but also offers resistance to rotation in one direction.

In a still further modification of the invention as shown in Fig. 6, the teeth and their recesses are arranged as if they were segments of the ribs shown in Figs. 1 and 2, that is to say, with their direction of resistance parallel to the axis of the plug. In yet another example of the invention, as shown in Fig. 8, the plug is provided with teeth adapted by recesses which are directionally arranged so as to be inclined to the axis of the plug, some in one direction and some in the other. The angle of inclination is such that by direct new pressure or by a slight rigging action on the plug the latter may be caused to lie down in their recesses to permit relatively free insertion of the plug.

It will be appreciated that the arrangements illustrated in Figs. 5 and 8 provide resistance not only to outward movement of the plug but against rotation of the plug in either direction.

As shown in Fig. 7, the plug is formed with a spiral rib which will obviously operate to resist direct outward movement whilst possibly permitting some degree of screwing or unscrewing action to facilitate insertion or withdrawal.

It has been found that the improved plug, if properly dimensioned, gives a better hold in the tube than the expanding plug type above referred to. At the same time, the improved plug is simpler and cheaper in construction and easier

to fit.

The invention is obviously not limited to the examples above described as the details thereof may be clearly modified without departing from the ambit of the invention. For example, the ribs, instead of being of saw tooth section may be of rounded shape and the recesses behind them may be of rounded shape also, whilst such recesses may be of the same sizes as the ribs.

Whilst above described in its application as a plug for the end of a cycle handle bar, it is obviously capable of other uses for which perhaps certain modifications of shape may be necessary.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An improved rubber plug or stopper characterised in that the body is formed on its outer periphery with one or more ribs or projections and a groove or recess immediately adjacent to each rib or projection into which the rib or projection may be wholly or partly displaced in one direction as the plug is pressed into position.

2. An improved plug or stopper having a body part smaller than the hole to be filled and having resilient ribs or projections thereon with adjacent grooves or recesses, each rib or projection standing proud of the body part to exert a pressure on the inner wall of the hole so that in one direction of movement of the plug in the hole the rib or projection will be displaced into the adjacent groove or recess and in any other direction will tend to leave the groove or recess and wedge between the body part and the inner wall of the hole.

3. An improved rubber plug or stopper according to claim 1 or 2, characterised in that the projection comprises an annular ring with inclined front face behind which ring is an annular groove adapted to receive the ring when the same is displaced in that direction.

4. An improved rubber plug or stopper according to claim 1, or 2, characterised in that the plug is formed on its outer periphery with a plurality of projections arranged longitudinally with inclined faces on one side and longitudinally arranged recesses immediately adjacent thereto adapted to receive the projection when the latter is displaced in that direction, all the ribs having their inclined faces directed in the same direction around the periphery.

5. An improved rubber plug or stopper according to claim 1 or 2, characterised

in that the plug is formed on its outer periphery with projections and recesses being a combination of an annular ring and groove as claimed in claim 3, and
5 longitudinally arranged projections with their complementary recesses as claimed in claim 4.

6. An improved rubber plug or stopper according to claim 1 or 2, characterised
10 in that the plug is formed on its outer periphery with a plurality of projections being segments of an annular ring with inclined front faces, behind each of which
15 projections is a recess which is a similar segment of an annular groove each adapted to receive its adjacent projection when the same is displaced in that direction.

7. An improved rubber plug or stopper according to claim 1 or 2, characterised
20 in that the plug is formed on its outer periphery with a helical rib having an inclined front face behind which rib is a helically arranged groove, adapted to
25 receive the rib when the same is displaced in that direction.

8. An improved rubber plug or stopper according to claim 4 or 5, characterised in
30 that the longitudinally arranged projections and their complementary recesses are inclined at small angles to the axis of the plug, some in one direction and some in the opposite direction, so as to restrict
rotation in either direction.

9. An improved rubber plug or stopper according to any of the preceding claims
35 1—6, characterised in that the rear face of the rib is substantially normal to the axis of the plug.

40 10. An improved rubber plug or stopper according to either of claims 7 or 8,

characterised in that a radial line drawn on the rear face of the rib or projection at any point is substantially at right angles
45 to the axis of the plug.

11. An improved rubber plug or stopper according to any of the preceding claims, characterised in that one face of the
50 groove or recess is inclined parallel to the leading face of the rib or projection.

12. An improved rubber plug or stopper according to any of the preceding claims, characterised in that the rib or projection
55 and its groove or recess are each of saw tooth cross section, the rib and groove having continuity at one wall.

13. A cylindrical plug or stopper having annular resilient ribs bordering annular
60 grooves, the ribs being shaped so as to be collapsed into the grooves, when the plug moves in one direction in a surrounding member contacting only with the ribs,
and self-wedging when moved in the other direction in that surrounding member.

14. A closing member comprising a
65 rubber plug or stopper according to any of the preceding claims, in combination with a surrounding member co-operating with the ribs or projections as herein set forth.

15. An improved rubber plug or stopper constructed, arranged and adapted for use
70 substantially as herein described with reference to and as illustrated in any one of the several figures of the accompanying drawings.

Dated this 3rd day of October, 1939.

For the Applicants,

WILSON GUNN & ELLIS,

Chartered Patent Agents,

54—56, Market Street, Manchester, 1.